March 21, 1895.

Sir JOHN EVANS, K.C.B., D.C.L., LL.D., Vice-President and Treasurer, in the Chair.

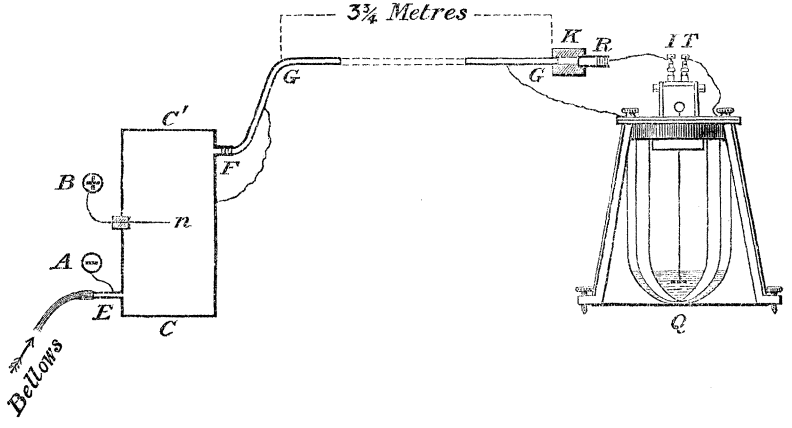
A List of the Presents received was laid on the table, and thanks ordered for them.

The following Papers were read :—

I. "On the Diselectrification of Air." By LORD KELVIN, P.R.S., MAGNUS MACLEAN, M.A., F.R.S.E., and ALEXANDER GALT, B.Sc., F.R.S.E. Received March 14, 1895.

§ 1. The experiment described in § 14 of our paper on the "Electrification of Air and other Gases by bubbling through Water and other Liquids" ('Roy. Soc. Proc.,' February 21, 1895), proves that air, electrified negatively by bubbling through water and caused to pass through a metallic wire gauze strainer, gives up some, but not a large proportion, of its electricity to the metal. We have now made a fresh experimental arrangement for the purpose of investigating diselectrification of air which has been electrified, whether positively or negatively, by other means than bubbling through water: with apparatus represented in figs. 1 and 2, which is simplified from that of our former paper by the omission of the apparatus for electrifica-

FIG. 1.



tion by bubbling, and for collecting large quantities of electrified air.

§ 2. In fig. 1, A B represent the two terminals of a Voss electric machine connected, one of them to a metal can, CC′ (a small biscuit canister of tinned iron), and the other to a fine needle, of which the point *n* is in the centre of the can. The wire making the connection to the needle passes through the centre of a hole in the side of the can, stopped by a paraffin plug. Air is blown from bellows through a pipe, E, near the bottom of the can, and allowed to escape from near the top through an electric filter, F, called the tested filter, from which it passes through a long block-tin pipe, GG, about $3\frac{3}{4}$ metres long and 1 cm. internal diameter, and thence through a short tunnel in a block of paraffin, K. From this, lastly, it passes through a second electric filter, R, into the open air. This second filter, which we sometimes call the *testing filter*, sometimes the *electric receiver*, is kept in metallic connection with the insulated terminal, I, of a quadrant electrometer, Q. The metal can and the block-tin pipe are metallically connected to the outer case and uninsulated terminal, T, of the quadrant electrometer.

§ 3. The testing filter or electric receiver consists of twelve discs of brass-wire cloth fixed across the mouth of a short metal pipe supported on the end of the paraffin tunnel in the manner represented in fig. 2, on a scale of twice the size of the filter which we have actually used, or of true size for a filter on a tube of 2 cm. diameter, which for some purposes may be better. One of eleven similar discs, of size adapted to a tube of 2 cm. diameter, and an outermost disc with projecting lugs, are shown, true size, and with the gauge of the wire-cloth which we have actually used, shown true size, in fig. 3. The eleven little circular discs of wire cloth are held in position by bending over them the four lugs belonging to the outermost disc, and all are kept compactly together by a short piece of india-rubber tube stretched over them outside as shown in fig. 2.

§ 4. We commenced with a few experiments to test the efficiency of the testing filter, R, with no tested filter at F, and merely continuous block-tin pipe, FGG, from the can to the paraffin tunnel. First, working the bellows with no electrification of the needle point, we found no sensible electric effect on the electrometer, which proved that, whether from natural electrification of the air of the laboratory, or by the action of the bellows, or by the passage of the air through the long metal pipe, no electrification sensible to our test was produced. After that we kept the needle point, *n*, electrified, either positively or negatively, for five or six minutes at a time by turning the little Voss machine, and we found large effects rising to about $3\frac{1}{2}$ volts in five minutes, positive or negative, according as *n* was positive or negative.

FIG. 2.

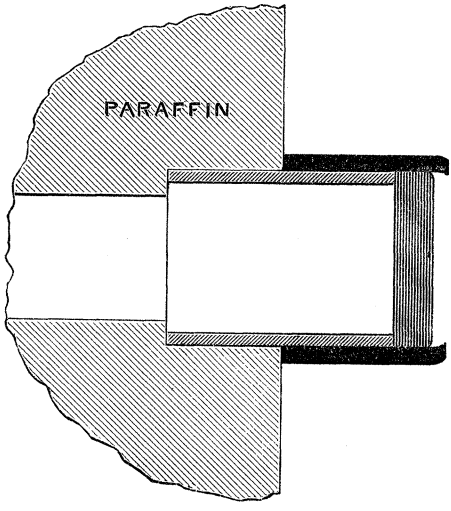
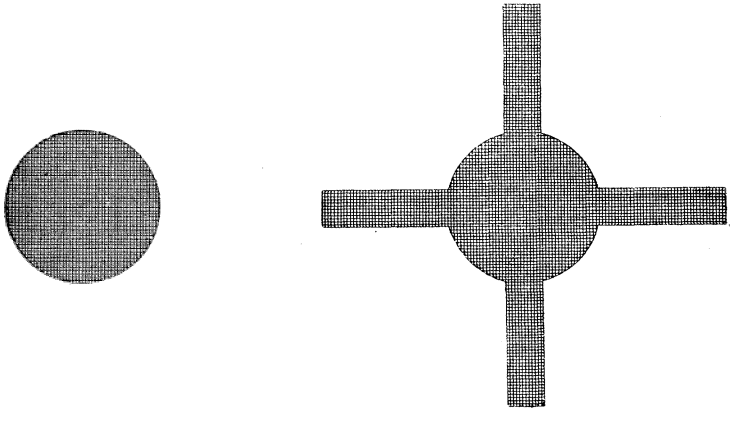


FIG. 3.

Twenty-five wires to the centimetre. Diameter of each wire is 0·16 mm. Hence each aperture is 0·24 mm. square.



§ 5. The apparatus is now ready to test the efficacy of filters or other appliances of different kinds placed at F for the purpose of diselectrifying air which has been electrified, whether positively or negatively, by the electrified needle point *n*. We began with a filter of 12 wire-gauze discs, placed at F and kept in metallic connection with the tin pipe outside. This nearly halved the electricity shown

by the electrometer. We then tried 24, 48, 72, 96, 120 wire-gauze discs, successively, placed in groups of 24, and separated from one another by short lengths of 2 cm. of lead tube, in the line of the flow of the air between F and G (fig. 1), all kept in metallic connection with the block-tin pipe and the outer case of the electrometer. We were surprised with the smallness of the additions to the diselectrifying efficiency of the 12 strainers first tried; for example, the filter of 120 wire gauzes only reduced the electrical indication to a little less than one-half of what it was with the 12 which we first tried.

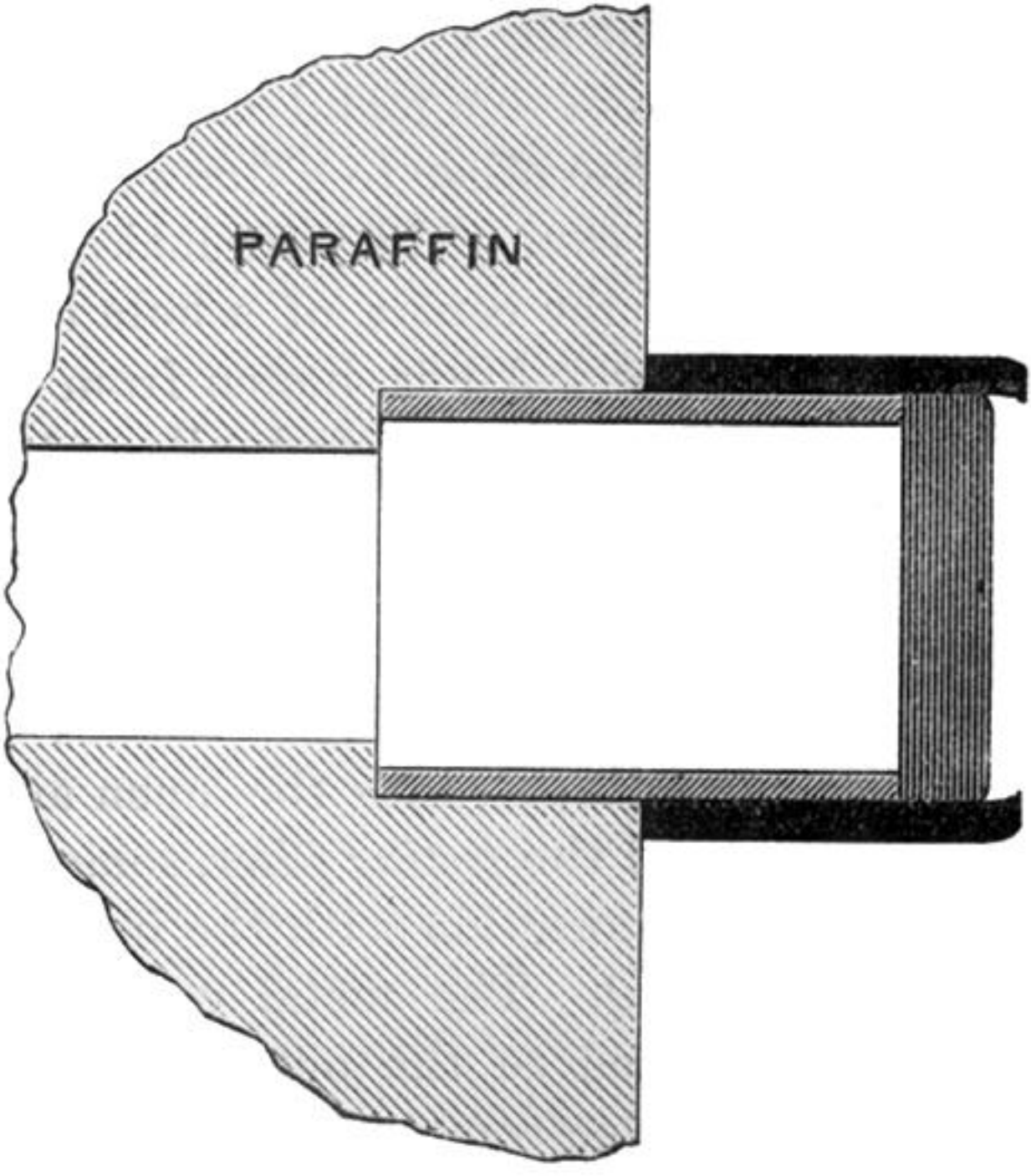
We found that cotton-wool between the spaces in the groups of 24 wire gauzes largely increased the diselectrifying effect. Thus, with 72 wire gauzes and cotton-wool we succeeded in reducing the electrical effect to about one-twelfth of what it was with only a filter of 12 wire gauzes; but hitherto we have not succeeded in rendering imperceptibly small the electricity yielded by the outflowing air to the testing filter R in our method of observation.

§ 6. We intend trying various methods of obtaining more and more nearly complete diselectrification of the electrified air flowing out of the can at F; and this for air electrified otherwise than by the needle point, as shown in the diagram: for instance, by an electrified flame in place of the needle point; or again by bubbling through water or other liquids. Meantime, the mere fact that the electricity, whether positive or negative, given to air by an electrified needle point, can be conveyed through 3 or 4 metres of small metal tube (1 cm. diameter), and shown on a quadrant electrometer by a receiving filter, is not without interest. We may add now that, with the receiving filter removed and merely a fine platinum wire put in the mouth of the paraffin tunnel, we have found that enough of electricity is taken from the outflowing air to be amply shown by the quadrant electrometer; which renders even more surprising the fact that the diselectrifying power of 120 strainers of fine wire-gauze should be so small as we have found it.

II. "On the Conditions affecting Bacterial Life in Thames Water." By E. FRANKLAND, D.C.L., F.R.S. Received January 31, 1895.

Since May, 1892, I have been making monthly determinations of the number of bacteria capable of development on a peptone-gelatine plate in a given volume of Thames water collected at the intakes of the Metropolitan water companies at Hampton. The number of microbes per cubic centimetre of water varied during this time between 631 and 56,630, the highest numbers having, as a rule, been

FIG. 2.



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